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09/937,858	09/28/2001	Yuji Matsuda	Y-189	7097

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EXAMINER
MOUTTET, BLAISE L

ART UNIT	PAPER NUMBER
2853	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No. 09/937,858	Applicant(s) MATSUDA, YUJI
	Examiner Blaise L Mouttet	Art Unit 2853

-- The MAILING DATE of this communication appears on th cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 May 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 September 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claims 7 and 16 are objected to because of the following informalities in syntax:

In claim 7, lines 3-4 and claim 16, lines 3, "detect the vertical bar at least two positions" should read --detect the vertical bar in at least two positions--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 2, 3, 6, 9 and 13-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9, lines 24-25 refers to "said major scanning direction". It is unclear whether this recitation is referring to the main scanning direction or the sub-scanning direction previously recited in the claim. For purposes of examination under 35 USC 102 and 35 USC 103 it will be assumed that this recitation is referring to said main scanning direction.

In claim 2, lines 1-4 and claim 9, lines 27-29 it is recited that the pattern element extending in the sub-scan direction is "almost perpendicular" to the main scanning direction. It is unclear whether the scope of this limitation includes or excludes the interpretation that the pattern element is exactly perpendicular. If an exactly

perpendicular pattern element is intended to be excluded it is unclear to what degree the pattern element must deviate from perpendicularity. For purposes of examination under 35 USC 102 and 35 USC 103 it is assumed that this recitation includes the possibility of exact perpendicularity. It is suggested by the examiner that the applicant might amend this recitation to read "substantially perpendicular" since applicant's specification seems to include the possibility of exact or near exact perpendicularity (see figure 3).

In claim 3, lines 3-4 it is recited that the at least one horizontal bar is "almost in parallel" with the main scan direction and in line 7 it is recited that the conveyance amount of the print paper is "almost perpendicular" to said main scan direction. The concerns expressed by the examiner as noted above apply to these limitations as well and the examiner suggests applicant change the language to read --substantially parallel-- or --substantially perpendicular-- as the case may be. The applicant is referred to MPEP 2173.05(b) regarding relative terminology in the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5, 7, 8 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cobbs et al. US 5,600,350 in view of Goetz et al. US 5,170,416.

Cobbs et al. discloses, regarding claim 1, an image forming device that forms an image on a print paper (30) in an ink jet recording method with a plurality of heads (102, 104, 106, 108), comprising:

main scanning direction moving means (figure 2, column 4, lines 23-31) for moving a carriage (100) in a main scanning direction, said carriage (100) having said plurality of heads (102, 104, 106, 108) mounted thereon;

paper conveying means (figure 3, column 4, lines 46-58) for conveying the print paper (30) in a sub-scanning direction;

pattern printing means (107) for printing, with at least one head, a test pattern including predetermined pattern elements (figure 5, column 5, lines 29-35);

pattern detecting means (200), mounted on said carriage (100), for detecting the pattern elements of the test pattern printed on the print paper by said printing means (107) (column 5, lines 7-15);

binary conversion means (304, figure 10) for binarizing an output of said pattern detection means (200);

position detection means (an optical reader) for detecting a position of the carriage in said main scanning direction (column 4, lines 32-45);

calculating means (306, 314) for moving said carriage (100) to detect the pattern elements of the test pattern with said pattern detecting means (200), for detecting a print position of the pattern elements based on a detection result of said position

detection means when a rising/falling edge of a binary signal obtained by said binary conversion means (304) is generated, and for calculating a mounting deviation error of each head in said main scanning direction (figure 10, column 7, lines 30-46),

wherein said position detection means is based on a linear scale (120) provided on a movement path of said carriage (100).

Regarding claim 2, the test pattern includes vertical bars (404) extending in the sub-scanning direction substantially perpendicular to said main scan direction (figure 5).

Regarding claim 3, the test pattern includes horizontal bars (408, figure 5) extending substantially in parallel with said main scan direction and the image forming device further comprises:

conveyance amount detecting means (160, figure 3) for detecting a conveyance amount of the print paper in the sub-scan direction substantially perpendicular to the main scan direction (column 4, lines 46-58); and

measuring means (308) for measuring the conveyance amount equal to or smaller than a minimum unit determined by a resolution of said conveyance amount detecting means (160) (column 7, lines 43-46),

wherein said calculating means (306, 314, figure 10) moves the paper on which the test pattern is printed, with the use of said paper conveying means with respect to the carriage to detect the pattern elements of the test pattern with said pattern detecting means, detects the print position of the pattern elements based on the detection results of said conveyance amount detecting means (160) and said measuring means (308) when a rising/falling edge of the binary signal obtained by said binary conversion means

(304) is generated, and calculates an amount of mounting deviation of each head in a sub-scanning direction based on the print position of the pattern elements printed by each head (figure 10, column 7, lines 30-46).

Regarding claims 4, 13 and 14, the pattern detecting means (200) includes light emitting elements (232, 234) and a light receiving element (240) (column 6, lines 19-27).

Regarding claims 7 and 10, a print position is based on an average value of the width of the detected vertical bar (figure 17, column 8, lines 61-64).

Cobbs et al. discloses, regarding claim 11, a method for use on an image forming device with a linear scale (120) provided on a carriage movement path, for detecting a deviation between a print position actually printed on a print paper by a head and a print target position said method comprising:

printing a predetermined print element (figure 5) at the target position on the print paper by the head mounted on a carriage (100) that scans in a major scanning direction (column 6, lines 51-67);

detecting said print element with a sensor (200) mounted on the carriage (100) (column 5, lines 36-45); and

detecting a position based on said linear scale (120) when the print element is detected and obtaining the deviation between the detected position and the print target position (column 2, lines 48-57).

Cobbs et al. fails to disclose, regarding claim 1, that the position detection means includes high resolution position detection means for detecting a position more finely

than a minimum unit determined by the resolution of the low resolution linear scale (120).

Cobbs et al. fails to disclose, regarding claim 5, that the low resolution position detection comprises a counter for counting a timing signal based on said linear scale (120) wherein said high resolution detection means comprises a timer which is initialized by said timing signal and measures a time with a predetermined clock signal.

Cobbs et al. fails to disclose, regarding claim 8, means for measuring a unit time interval of said linear scale at a time said pattern elements are detected and means for correcting a measured value of said timer based on the measured value and a theoretical value of said unit time interval.

Cobb et al. fails to disclose, regarding claim 11, providing a timer for detecting a position within a unit interval determined by a resolution of said linear scale (120) and detecting a high resolution position within the unit interval with the timer.

Cobb et al. fails to disclose, regarding claim 12, correcting the high resolution position within the unit interval based on an actual measurement value measured in a minimum interval of said linear scale and a theoretical value thereof.

Goetz et al. discloses, regarding claim 1, position detection means for detecting the position of a print carriage in a main scan direction which includes high resolution position detection means (the circuitry producing the CKOUT signal as shown in figures 4A and 4B) for detecting a position more finely than a minimum unit determined by the resolution of low resolution position detection means (86, 88) (column 3, lines 15-25).

Goetz et al. discloses, regarding claim 5, that the low resolution position detection comprises counters (86, 88) for counting a timing signal (CLK signal) based on a linear scale (20) (column 4, lines 43-55) wherein said high resolution detection means comprises a timer (CLKOUT signal) which is initialized by said timing signal and measures a time with a predetermined clock signal (column 4, line 56 - column 5, line 29).

Goetz et al. discloses, regarding claim 8, means for measuring a unit time interval of said linear scale (this corresponds to the means for generating the SIN signal in figure 5) and means for correcting a measured value of said timer (this corresponds to the means for generating the QPRN signal of figure 5) based on the measured value (SIN) and a theoretical value (INPUT A) of said unit time interval (column 6, lines 44-63).

Goetz et al. discloses, regarding claim 11, providing a timer (the circuitry that produces CKOUT signal as shown in figures 4A and 4B) for detecting a position within a unit interval determined by a resolution of a linear scale (20) and detecting a high resolution position within the unit interval with the timer (column 3, lines 15-25).

Goetz et al. discloses, regarding claim 12, correcting the high resolution position within the unit interval based on an actual measurement value measured in a minimum interval of said linear scale and a theoretical value thereof (column 6, lines 44-63, figure 5).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide the means and steps of Goetz et al. to establish a higher resolution and corrected timing signal from the codestrip of Cobbs et al.

The motivation for doing so would have been to correct for errors in the codestrip detection and to more accurately determine the position of the printheads as taught by column 2, line 42 - column 3, line 8 of Goetz et al.

4. Claims 6 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cobbs et al. US 5,600,350 in view of Goetz et al. US 5,170,416, as applied to claim 2, and further in view of Gast et al. US 6,367,903.

Regarding claim 16, Cobbs et al. discloses printing and detecting a vertical bar in two positions to establish a print position based on an average of the detected positions (figure 17).

Cobbs et al. in view of Goetz et al. fails to disclose that the vertical bar is printed by different portions of a single head.

Gast et al. discloses a vertical bar that is printed by different portions of a single head and detecting the vertical bar in two positions to establish a print position based on the average value of the detected positions (figure 3, figure 15a, figure 15b, figure 25, column 3, lines 35-46).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to print vertical bars in the sub-scanning direction comprising the plurality

of portions by different portions of a single head as taught by Gast et al. in the test pattern of Cobbs et al. in view of Goetz et al.

The motivation for doing so would have been in order to correct for a skewed printhead as shown by figures 15A and 15B of Gast et al. and taught in column 4, lines 11-28.

5. Claims 9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cobbs et al. US 5,600,350 in view of Gast et al. US 6,367,903.

Cobbs et al. discloses, regarding claim 9, an image forming device that forms an image on a print paper (30) in an ink jet recording method with a plurality of heads (102, 104, 106, 108), comprising:

main scanning direction moving means (figure 2, column 4, lines 23-31) for moving a carriage (100) in a main scanning direction, said carriage (100) having said plurality of heads (102, 104, 106, 108) mounted thereon;

paper conveying means (figure 3, column 4, lines 46-58) for conveying the print paper (30) in a sub-scanning direction;

pattern printing means (107) for printing, with at least one head, a test pattern including predetermined pattern elements (figure 5, column 5, lines 29-35);

pattern detecting means (200), mounted on said carriage (100), for detecting the pattern elements of the test pattern printed on the print paper by said printing means (107) (column 5, lines 7-15);

binary conversion means (304, figure 10) for binarizing an output of said pattern detection means (200);

position detection means (an optical reader) for detecting a position of the carriage in said main scanning direction (column 4, lines 32-45);

calculating means (306, 314) for moving said carriage (100) to detect the pattern elements of the test pattern with said pattern detecting means (200), for detecting a print position of the pattern elements based on a detection result of said position detection means when a rising/falling edge of a binary signal obtained by said binary conversion means (304) is generated, and for calculating a mounting deviation error of each head in said main scanning direction (figure 10, column 7, lines 30-46),

wherein, for each head, said test pattern includes as a pattern element at least one vertical bar extending in the sub-scan direction substantially perpendicular to said main scanning direction (404, figure 5, column 8, lines 40-51).

Regarding claim 17, a center position of a width of a pattern element is calculated to correct for carriage speed and drum curvature as illustrated in figure 17 and described in column 8, line 52 - column 9, line 17.

Cobbs et al. discloses printing sequential vertical bars in sequential scans of a printhead (figure 17).

Cobbs et al. fails to disclose that said pattern printing means (107) causes each of different portions of a single head to print a plurality of dots sequentially in a plurality of passes, said plurality of dots constituting a portion of said vertical bar.

Gast et al. teaches utilizing pattern printing means (figure 3) to print vertical bars alignment patterns and divide said vertical bars into a plurality of portions (figure 25, column 11, lines 61-63 wherein the plurality of portions correspond to the plurality of patterns printed by the primitves) and that each of different portions of a single head print a plurality of dots sequentially in a plurality of passes, said plurality of dots constituting a portion of said vertical bar (column 3, lines 35-46).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to print vertical bars in the sub-scanning direction comprising the plurality of portions by different portions of a single head as taught by Gast et al. in the test pattern of Cobbs et al.

The motivation for doing so would have been in order to correct for a skewed printhead as shown by figures 15A and 15B of Gast et al. and taught in column 4, lines 11-28.

Additional Prior Art

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yamane US 5,926,192 discloses establishing finer resolution print timing signals from a print carriage encoder strip.

Uchikata US 6,354,691 discloses establishing finer resolution print timing signals from a print carriage encoder strip and correcting the timing signals based on signals generated by the bi-directional motion of the carriage.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is (703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow, Jr. Art Unit 2853, can be reached on (703) 308-3126. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet September 26, 2002

BM Sept. 26, 2002

John Barlow
Supervisory Patent Examiner
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